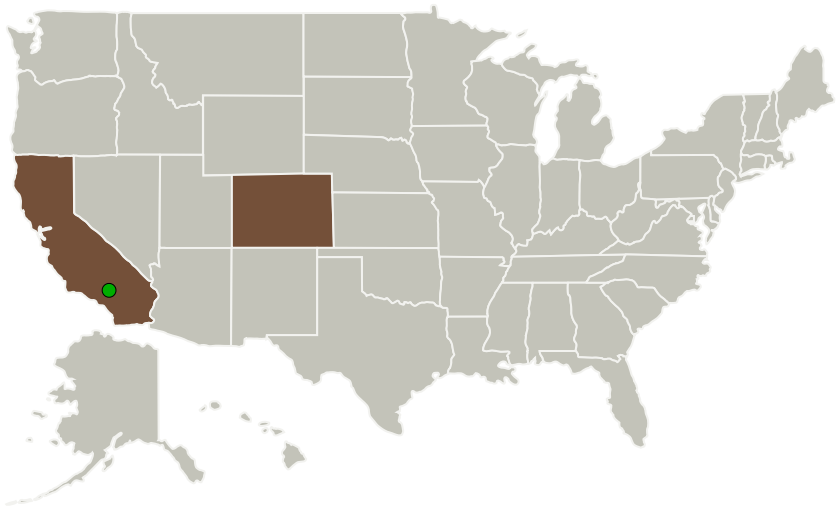
Estimation and Prediction of Unmanned Aerial Vehicle Trajectories, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

There is serious concern about the introduction of UAV's into the National Air Space because of their potential to increase the risk of loss of separation (LOS) between aircraft. Many UAV's lack a ``sense and avoid'' (SAA) capability, i.e., they do not possess an adequate means of making the UAV pilot aware of the airspace around the platform, nor do they provide the mechanism for avoiding LOS with other aircraft. This program will address the need for LOS avoidance for UAV's operating in NAS through the development of target state estimation and trajectory prediction algorithms. Numerica proposes a research program that will focus on two critical aspects of SAA algorithms: ¼ Development of a target state estimator that uses data up to the current time to form a robust estimate of the state vector (position, velocity, acceleration, and possibly other parameters). ¼ Development of a target trajectory prediction algorithm. This component will take the target state estimate and probabilistically generate various possible target trajectory paths. The outcome of the research will be a complete proof-of-concept solution with a software prototype, and simulation results showing performance metrics.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Numerica Corporation	Lead Organization	Industry	Fort Collins, Colorado
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Colorado

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139949)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Numerica Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

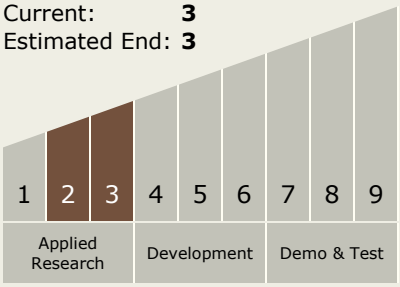
Carlos Torrez

Principal Investigator:

Nick Coult

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.1 Guidance and Targeting Algorithms
    - TX17.1.2 Targeting Algorithms

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System